

ISYS1055/1057 Tutorial/Lab Sheet

Relational Modelling 3 – Design

1. The Customers relation of the Rocky Concrete database shown below. Moreover, the following FDs hold.

$\text{Cust_no} \rightarrow \text{Cust_name, Street, Town, Postcode, Cr_limit, Curr_balance}$
 $\text{Town} \rightarrow \text{Postcode}$

Cust_no	Cust_name	Street	Town	Postcode	Cr_limit	Curr_balance
1066	Nevs Nursey	White Hart	Bundoora	3083	500	450
13144	Preston City	High Street	Preston	3072	3000	1000
1776	Di Hunter	Thornton Farm	Whittlesea	3757	500	500
2001	Glads Gladdies	Childs Road	Mill Park	3082	500	0
2002	Mill Park	Betula Ave	Mill Park	3082	1000	300

Consider the following decomposition of Customers:

$\text{Cust1}(\text{Cust_no}, \text{Cust_name}, \text{Street}, \text{Town}, \text{Postcode})$

$\text{Cust2}(\text{Postcode}, \text{cr_limit}, \text{curr_balance})$

Answer questions:

- (a) The Customers relation is not in BCNF or 3NF. Explain the reason.
 - (b) Is there any redundancy in the given FDs?
 - (c) Does the decomposition break any FD? Explain your answer.
 - (d) Specify the primary key (underline) and any foreign keys (asterisk) of Cust1 and Cust2.
2. Answer questions in SQL*Plus. The decomposition in Question 1 is lossy. With this decomposition, the current data in the Customers table is projected onto attributes in Cust1 and Cust2.
 - Download rocky-complete.sql from Blackboard and run it to create the Rocky Concrete database.
 - Create views (virtual tables) for projections of Customers onto Cust1 and Cust2. The SQL*Plus view definition syntax is:

```
CREATE VIEW <viewname> AS <query>;
```
 - Write an SQL query to join Cust1 and Cust2.
 - Explain the spurious tuples in the joining result
 3. Decompose Customers into BCNF/3NF relations using the 3NF decomposition algorithm. Your decomposition must be lossless-join and dependency preserving.

4. For each of the following relations, based the assumed FDs (refer to Question 2 of the RM2 tute sheet). decompose each relation to 3NF/BCNF using the 3NF decomposition algorithm.

(a) Employee(EmpNo, EmpName, Salary, Project, ProjName, FinishDate)

An employee can work on more than one project at a time.

(b) Student(StudNo, StudName, CNo, CTitle, Result, StaffID).

5. The OMDB database schema is given below. Discuss the likely FDs and normal form (whether BCNF/3NF) for each relation.

MovieInfo (mvID, title, rating, year, length, studio)

Director(directorID, firstname, lastname)

Member(username, email, password)

Actor(actorID, firstname, lastname, gender, birthplace)

Cast(mvID*, actorID*)

Direct(mvID*, directorID*)

Genre(mvID*, genre)

Ranking(username*, mvID*, score, voteDate)